ADVICE FOR THE

RESTRICTION AND PREVENTION

—OF—

MENINGITIS.

Sometimes reported as "Meningitis," "Acute Meningitis," "Spinal Meningitis," "Cerebral Meningitis," "Infectious Meningitis," "Cerebro-Spinal Meningitis," "Tubercular Meningitis," "Cerebro-Spinal Fever," "Spinal Fever," and "Spotted Fever."

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1. **Definition.**—Meningitis is an inflammation of the meninges or membranes covering the brain and spinal cord.

2. **All forms of meningitis are very frequently fatal.**—In Michigan, according to the Registration Reports issued by the Secretary of State, the average number of deaths from all forms of meningitis in the ten years, 1887–96, is 219 per year; but it is believed that not more than two-thirds of the deaths were then reported, so that the numbers of deaths which actually occurred in Michigan from all forms of meningitis were probably over three hundred per year, being more deaths than from measles, whooping-cough, or smallpox.

3. **Importance of meningitis as a cause of deaths.**—During the year 1898, under the new law requiring the registration of deaths, by which it is believed that very nearly all deaths are reported, the deaths from all forms of

meningitis were nearly 800; and for the year 1899 the Monthly Bulletins show that the reported deaths from meningitis were 830, and this number does not include the number of deaths reported as "meningitis" nor the number of deaths from tubercular meningitis. During the years 1898 and 1899 meningitis, of all forms, has caused more deaths than typhoid fever or diphtheria and croup; and more deaths than scarlet fever, whooping-cough, measles, and smallpox combined. It is quite possible that there may be a considerable further increase in meningitis unless thorough efforts are made for its restriction and prevention.

4. **Meningitis caused by many species of germs.**—It is well known that inflammation of the membranes covering the brain and spinal cord may be caused by the bacillus tuberculosis, by the specific germs of pneumonia, by the typhoid fever bacillus, by the influenza bacillus, by the anthrax bacillus and by streptococci—such germs as cause erysipelas; in fact, it is probable that meningitis may be and is caused by any germ capable of causing inflammation, which can get into the circulating blood and reach the meninges.

5. **The diseases allied to meningitis** are communicable diseases, most of them dangerous,—such as consumption, pneumonia, influenza, etc.

6. **Cerebro-spinal meningitis a "dangerous communicable disease."**—For a long time it has been well known that cerebro-spinal meningitis was a communicable disease, but just how the disease was spread has been in doubt in the minds of investigators, until quite recently. While a great many different species of germs have been found as the apparent cause of cases of cerebro-spinal meningitis, yet the prevailing opinion of those making investigations along that line now is, that the organism known as the *diplococcus intracellularis meningitidis* is usually the specific cause of epidemic cerebro-spinal meningitis. It is believed that the diplococcus pneumoniæ of Frænkle is also a very frequent causative factor of cerebro-spinal meningitis. Hence both pneumonia and meningitis may be caused by the same germ, in one instance acting upon the lungs to produce pneumonia, and in the other instance upon the membranous covering of the brain and spinal cord to produce meningitis; just as the bacillus tuberculosis in the meninges causes tubercular meningitis, and in the lungs causes what is called consumption. That cerebro-spinal meningitis is a communicable disease seems to be a well-settled fact. The commission appointed by the Massachusetts State Board of Health, after a somewhat extensive investigation of the causation of this disease, state, in the summary, that "Epidemic cerebro-spinal meningitis is an acute infectious disease, which is produced by a micrococcus characterized by its growth in pairs and by certain cultural and staining properties." This refers to the diplococcus intracellularis. W. J. Class, M. D., Medical Inspector Chicago Health Department, after a very extensive investigation of the epidemic which occurred in Chicago early in 1898, says: "From a consideration of our present knowledge of epidemic cerebro-spinal meningitis, the writer arrives at the following conclusions:

"(1.) That epidemic cerebro-spinal meningitis is to be classed among the contagious diseases, belonging in this respect to the same category as phthisis pulmonalis.

"(2.) That unsanitary conditions exert great influence in affording a proper nidus for the growth of the germ of this disease.

"(3.) That the health authorities should receive notice of the occurrence of a case of this disease in order that sanitary defects may be remedied.

"(4.) Persons afflicted with this disease should, whenever possible, be isolated, and all evacuations rendered sterile by the use of antiseptics."

From the foregoing it may be seen that cerebro-spinal meningitis is a dangerous disease and that it is a communicable disease.

7. **The mode of communication of this disease.**—How the germs gain access to the meninges is not actually known, but it is believed to be mainly by the circulating blood, and that while in ordinary years the germs enter the circulating blood from infected intestines, as well as from infected air-passages, in epidemic meningitis the germs most generally enter the body by way of the nose and mouth. In a number of instances, organisms identical with those believed to be the specific cause of meningitis, on microscopical examination have been found in the nose.

8. **All cases of meningitis are probably cerebro-spinal meningitis.**—It is probable that deaths and cases of sickness reported as being caused by the various forms of meningitis, and more especially in times of an epidemic of cerebro-spinal meningitis, are really cases of cerebro-spinal meningitis. Relative to deaths reported to the Secretary of State as occurring in the month of March, 1899, from the different forms of meningitis other than cerebro-spinal, on further inquiry of the physicians who certified to the cause of death, it was learned that at least thirty per cent were really caused by cerebro-spinal meningitis; and Doctors Councilman, Mallory and Wright, in their report to the Massachusetts State Board of Health, published in 1898, say: "There is little doubt that all cases of meningitis are cerebro-spinal, the meninges of the cord being affected as well as those of the brain."

9. **Cases of meningitis should be reported.**—All cases of the various forms of meningitis should be reported to the health officer; and measures should be taken for the restriction and prevention of the spread of the disease, in all forms. The health officer should report all cases to the Secretary of the State Board of Health, that measures can be instituted for learning as much as possible concerning them. Detailed statements relative to each case occurring in this State are respectfully solicited from attending physicians as well as from health officers, that the study of this disease may be more complete and thorough.

10. **Destruction or disinfection of the sputa and discharges from the nose.**—It is evident that, if the disease is communicated mainly through the discharges from the nose and other air passages, the most certain preventive would be to destroy the discharges from those passages. It is for the patient's own safety to destroy the infectiousness of such discharges, because it reduces to a minimum the possibility of reinfection. So far as possible, the expectorated mucus and discharges from the nose of a person sick with cerebro-spinal meningitis should be disinfected. If a cuspidor is used it should be partly filled with water, and might well contain constantly a disinfectant, such as a five per cent solution of carbolic acid,—one ounce of carbolic acid dissolved in a pint and a half of water. If a constant disinfectant is not used the cuspidors should be washed twice each day in boiling water, and the contents should be disinfected with a solution of

bichloride of mercury. Generally the patient will soon be unable to use a cuspidor, when small pieces of soft cloth should be used for the discharges from the nose and mouth, which should be burned as soon as used.

11. **Destruction or disinfection of the dejecta.**—All dejecta of a person sick with cerebro-spinal meningitis, should be destroyed or disinfected, because, as above stated, it is believed that the germs enter the general circulation and may pervade the entire body, and the infection may sometimes come from the intestinal canal, therefore the germs may be in the fæces of those having the disease who swallow sputa containing the germs. Disinfect each discharge by thoroughly mixing it with at least one ounce of chlorinated lime in powder, or one quart of "Standard Solution No. 1,"* recommended by the American Public Health Association's committee, or by a sufficient quantity of boiling water to bring all up to a temperature of 165 degrees F. at least.

12. **Isolation of the patient.**—While it is advocated by some that isolation of those sick with cerebro-spinal meningitis should be practiced for the public safety, as well as for the good of the patient, yet it is believed that if care is taken with all the discharges from the nose and other passages, isolation of the patient may not always be necessary, although it is probably wise for all who can do so, and especially all children, to keep away from the patient.

13. **Ventilation of buildings.**—Meningitis is believed to be caused by specific micro-organisms usually inhaled as atmospheric dust. Through better systems of ventilation, much may be done for lessening the number of micro-organisms inhaled with the dust of floors, carpets, etc., especially by having the foul-air exits at the floor level, so that the general motion of the foul air shall be downwards, and not upwards into the nostrils of the inmates of the room. This is especially important with reference to all public buildings, as, also, that they shall constantly have a liberal supply of fresh air.

14. **Personal precautions.**—Any person who sweeps and dusts a room which has recently been occupied by a person sick with meningitis *or with any one of the diseases the germs of which are concerned in causing meningitis*, might well use a respirator. Several folds of gauze moistened and tied loosely over the nose and mouth might be used.

15. **The spitting nuisance dangerous to the public health.**—It is now well known that the human saliva is the natural and universal habitat of many species of micro-organisms. These organisms gain access to the mouth in various ways, the most common being by breathing air containing them. The sputa are therefore the common way by which many of the dangerous communicable diseases are spread. After drying, the germs with which the sputa are charged mingle with the dust of rooms in homes, churches, schools, public halls, stores, and cars. In these places they are inhaled by human beings with results dependent largely upon meteorological conditions. The meteorological conditions cannot always be avoided, therefore success in the restriction of those dis-

* "Standard Solution No. 1," is made by adding to each gallon of soft water, four ounces of chloride of lime of the best quality, which should contain at least 25 per cent of available chlorine. "Use one quart of this solution for the disinfection of each discharge in [meningitis] cholera, typhoid fever, etc. Mix well and leave in vessel for at least one hour before throwing into privy-vault or water-closet."

eases must lie in the direction of the destruction of the germs which produce those diseases. Frequently it is sputa containing the organisms of these diseases which is the primary cause of each case. It is probable, therefore, that could the sputa all be destroyed as soon as ejected, these diseases would soon disappear. We are confronted with the practical problem of how this may be done, either wholly or in a large degree. This problem is not an easy one to solve, for the reason that every man regards himself as independent and endowed with the inalienable right enjoyed by man throughout all ages, of depositing saliva wherever he chooses. Many municipalities are endeavoring to enforce regulations more or less stringent to prohibit spitting upon streets and in public places. Those efforts are largely due to the knowledge now becoming so common that the germs of consumption are spread by the air containing the germs of this disease which have been ejected in the sputa of the victims of this disease. When it becomes generally understood that sputa may contain not only germs of consumption, but also the germs of many other dangerous communicable diseases, the efforts that are now being put forth to prohibit this public and dangerous nuisance should be largely increased.

Legal measures it is obvious can be used only against the person spitting in public places. The person who contaminates the air of his home with his saliva is largely beyond the reach of such measures. Public opinion is necessary to sustain the enforcement of any law. It is especially necessary where it is sought to enforce a law depriving citizens of a privilege they have long enjoyed and can see no reason why they should not continue to possess. Education of the people concerning the importance of destroying or disinfecting all sputa must, therefore, precede forcible measures. This education should be such as to induce every intelligent person to destroy or disinfect the saliva he or she ejects and to insist that the careless and the ignorant be compelled to do likewise. It is to be hoped that such education will result in the formation of public opinion so that it will demand that the law shall not only reach the public spitter, but that it will also apply to the person who contaminates his own home, thus not only endangering his own family, but also endangering the lives of all who may enter such a home. The press, the teachers in our public schools, the preachers in our pulpits, and all others who in any degree mould public opinion should urge this most important sanitary reform.

16. **Exposure to cold should be avoided.**—Statistics of sickness and of deaths, collated with meteorological statistics seem to prove that epidemics of cerebro-spinal meningitis occur after unusually cold winters, and, during epidemic years, the disease usually reaches its maximum during the month of April, and a secondary maximum in August, coincident with or following the diarrheal and intestinal diseases; and in non-epidemic years the greatest number of deaths occur in August. Statistics have also proved that an epidemic of influenza is generally accompanied or followed by an increase of nearly all the diseases that enter the body by way of the air-passages, including pneumonia, consumption, and especially cerebro-spinal meningitis. An explanation relative to this last-named disease is offered, that the germ now known to be the most common cause of pneumonia, has been found to be quite generally present in the sputum of persons during epidemics of influenza, and has been found in the pus of cerebro-spinal meningitis. During epidemics of this disease every person should avoid exposure to cold, to chill from a change from heavy to light clothing, and to shock from a very hot or cold

bath, all of these influences having a tendency to increase blood pressure, by contraction of surface blood-vessels that have muscular coats, thus unduly increasing the pressure in those blood vessels of the brain and spinal cord, which have not such muscular coats.

17. **One variety of the disease may be conveyed by milk.**—The testing of all cows by tuberculin, and rejecting the milk of all cows found thereby to have tuberculosis, would probably go far toward the prevention of tubercular meningitis, which is one of the worst forms of meningitis.

18. **Disinfection.**—The dusting of objects in the room, the cleansing of the floor, walls, or ceiling of the living or sleeping room of a person suffering from meningitis, or from one of the diseases the germs of which are believed to be concerned in the causation of meningitis, should be deferred until after the room and contents have been subjected to the fumes of burning sulphur, or of formaldehyde. Curtains, draperies, carpets, clothing, and all movable articles should be **exposed to sunlight in the open air.** The unwashed clothing of a person sick with such a disease should not be mingled with the unwashed clothing of another person; care should be taken that the handkerchiefs be boiled, that other articles liable to harbor the germs be disinfected, and that no virus come in contact with a cut or injured hand.

No one should sleep in the same room with a patient, nor in a room which has been recently occupied by a patient sick with meningitis or an allied disease, unless the room (with all its contents) has been previously thoroughly disinfected, first subjecting it, for twenty-four hours, to strong fumes of burning sulphur, or of formaldehyde, and then it should for several hours be exposed to currents of fresh air. But neither of these agents should be relied upon exclusively. After fumigation, the walls should be whitewashed, alabastined, painted, repapered, or rubbed with bread crumbs which should then be burned; the woodwork, including the floor, should be painted or thoroughly washed; and, if any sputum is deposited thereon, it should be washed with a solution of bichloride of mercury, one part to five hundred parts of water.

Rooms subjected to sulphurous fumes or to formaldehyde must be vacated. For a room ten feet square at least three pounds of sulphur should be burned, or at least eight fluid ounces of solution containing forty per cent formaldehyde, should be rapidly distilled into the room; and for larger rooms proportionately increased quantities should be used, at the rate of at least three pounds of sulphur or at least eight fluid ounces of formaldehyde solution per each 1,000 cubic feet of air space.

Hang up and spread out as much as possible all blankets and other articles to be disinfected; turn pockets in clothing inside out, and otherwise facilitate the access of the disinfecting fumes to all infected places.

19. **Collection of information.**—Householders and physicians in Michigan are required by law to report every case of cerebro-spinal meningitis to the local health officer. Health officers and physicians are requested to continue to send to the office of the State Board of Health, at Lansing, information concerning cases under their observation where meningitis appears to have been communicated, directly or indirectly, from one person to another, and other interesting facts in connection with such cases, such as the occurrence of meningitis after exposure to the germs from a case of influenza, pneumonia or consumption.